1. A method for the simultaneous determination of a sample thickness **L** and index of refraction **n**, the method comprising:

a) forming said sample with a first and a second surfaces;

b) forming a radiation beam and impinging said radiation beam onto said sample at a first incidence angle A_1 relative to an axis perpendicular to said first surface;

c) reflecting said impinged radiation beam from said first and said second surfaces of said sample forming a first and a second reflected radiation beams;

d) impinging said first and second reflected radiation beams on a detection device;

e) measuring a distance d_1 on said array between an impingement point of said first reflected beam and an impingement point of said second reflected radiation beam;

f) altering said first incidence angle to a second incidence angle A_2 and again measuring a distance d_2 between an impingement point of a third reflected beam and an impingement point of a fourth reflected beam on said detection device;

g) obtaining the sample thickness **L** and sample index of refraction **n** from the following equations:

$$d_1 = [2.\mathbf{L}/\mathbf{n}].[\sin A_1/(1-(\sin^2 A_1)/\mathbf{n}^2)^{1/2}]$$ and

$$d_2 = [2.\mathbf{L}/\mathbf{n}].[\sin A_2/(1-(\sin^2 A_2)/\mathbf{n}^2)^{1/2}]$$

2. A method for the simultaneous determination of a sample thickness **L** and index of refraction **n**, the method comprising reflecting a radiation beam at a first incidence angle A_1 onto a sample having a first and a second parallel reflective surfaces and projecting a first surface reflected radiation beam and a second surface reflected

radiation beam onto a detection device, determining a distance d_1 between said projected reflection beams onto said detection device, altering said incidence angle to a second incidence angle A_2 and measuring a second distance d_2 between said projected reflection beams onto said detection device, and solving the following system of equations:

$$d_1 = [2.\mathbf{L}/\mathbf{n}].[\sin A_1/(1-(\sin^2 A_1)/\mathbf{n}^2)^{1/2}] \text{ and}$$

$$d_2 = [2.\mathbf{L}/\mathbf{n}].[\sin A_2/(1-(\sin^2 A_2)/\mathbf{n}^2)^{1/2}]$$

to obtain values for **L** and **n**.

3. A method for the simultaneous determination of a sample thickness **L** and index of refraction **n**, the method comprising:

a) directing along an axis forming a first angle A_1 with said sample a radiation beam, transmitting said radiation beam through said sample, intercepting said transmitted radiation beam by a detection device and measuring a distance d_1 between a point on said detection device where said axis intercepts said detection device and a point on said detection device where said transmitted beam impinges on said detection device; and

b) directing said radiation beam along a second axis forming a second angle A_2 with said sample, again transmitting said radiation beam through said sample and measuring a second distance d_2 between a point on said detection device where said second axis intercepts said detection device and a point on said detection device where said again transmitted beam impinges on said detection device; and

c) solving the following system of equations:

$$d_1 = \mathbf{L}\ [\ \sin A_1 - (\sin 2A_1 \div 2(\mathbf{n}^2-\sin^2 A_1)^{1/2})] \text{ and}$$

$$d_2 = \mathbf{L}\,[\,\sin A_2 - (\sin 2A_2 \div 2(\mathbf{n}^2 - \sin^2 A_2)^{1/2})]$$

to obtain values for **L** and **n**.

4. The method according to any one of claims 1-3 wherein the detection device comprises a photo-detector.

5. The method according to any one of claims 1-3 wherein angle A_1 and angle A_2 are both greater than 10 degrees.

6. The method according to any one of claims 1-3 wherein the radiation beam is monochromatic.

7. The method according to any one of claims 1-3 wherein the radiation beam is collimated.

8. The method according to any one of claims 1-3 wherein the radiation beam is a laser beam.

9. The method according to any one of claims 1-3 wherein the sample ~~is~~ transmits a portion of the radiation beam.

10. The method according to any one of claims 1-3 wherein the sample is a liquid in a cuvette.

11. The method according to any one of claims 1-3 wherein the first and the second surfaces of the sample are parallel.

12. The method according to any one of claims 1-2 wherein the radiation beam is polarized and the incidence angles A_1 and A_2 both correspond to internal angles smaller than a total internal reflection angle at each of said surfaces.

13. A method for the simultaneous determination of a sample thickness **L** and index of refraction **n**, the method comprising:

a) directing a substantially monochromatic collimated beam of radiation onto said sample along an axis forming a first angle A_x and a second angle A_y in a coordinate system having said sample in a plane defined by the x and y axis of said system, wherein said A_x is measured in a plane defined by the x and z axes and A_y in a plane defined by the y and z axes,

b) transmitting said beam through said sample and impinging said transmitted beam onto an array of radiation detectors arrayed in a plane parallel to said x-y plane;

c) measuring a first distance d_x on the x-axis between a point where said axis of monochromatic collimated beam impinges on said array of radiation detectors and a point where the monochromatic collimated beam impinges on said array of radiation detectors,

d) measuring a second distance d_y on the y-axis between a point where said axis of monochromatic collimated beam impinges on said array of radiation detectors and a point where the monochromatic collimated beam impinges on said array of radiation detectors; and

e) solving the following system of equations:

$$d_x = \mathbf{L}\,[\,\sin A_x - (\sin 2A_x \div 2(\mathbf{n}^2 - \sin^2 A_x)^{1/2})]$$ and

$$d_y = \mathbf{L}\,[\,\sin A_y - (\sin 2A_y \div 2(\mathbf{n}^2 - \sin^2 A_y)^{1/2})]$$

to obtain values for **L** and **n**.

14. A method for the simultaneous determination of a sample thickness **L** and index of refraction **n**, the sample having substantially parallel first and second surfaces lying in an x-y plane of a Cartesian co-ordinate system having x, y and z axes, the two surfaces separated by said distance **L** measured along the z axis, the method comprising:

a) directing an incident radiation beam of substantially collimated monochromatic radiation onto said sample, said radiation beam forming an angle Ax in the x-z plane and an angle Ay in the y-z plane relative to the z axis;

b) reflecting said incident radiation off said first and said second surfaces;

c) intercepting said reflected incident radiation from said first and second surfaces with an array of radiation sensors and determining a first distance dx and a second distance dy between a point of incidence on said array of radiation sensors of said radiation beam reflected from said first surface and a point of incidence of said radiation beam reflected off said second surface measured along said x axis and said y axis respectively; and

d) solving the following equations simultaneously for said thickness **L** and said index of refraction **n**:

$d_x = [2.L/n].[\sin A_x/(1-(\sin^2 A_x)/n^2)^{1/2}]$ and

$d_y = [2.L/n].[\sin A_y/(1-(\sin^2 A_y)/n^2)^{1/2}]$

15. The method according to claims 13 or 14 wherein said array of radiation sensors is a single two dimensional CCD sensor or an array of CCD sensors.

16. The method according to claims 13 or 14 wherein said array of radiation sensors is connected with a computer and said computer is programmed to measure the distances d_1, d_2, d_x or d_y on said array of radiation sensors.

17. The method according to claim 16 wherein said computer is also programmed to solve said equations for **L** and **n**.

18. A system for the simultaneous determination of a sample thickness L and index of refraction **n**, the sample having substantially parallel first and second surfaces, comprising:

a) a radiation beam along a path;

b) a holder adapted to hold said sample in said beam path at an adjustable angle relative to said sample surfaces;

c) a radiation detector placed to receive said radiation beam after said beam has impinged on said sample;

d) measuring means for measuring a distance between a reference point on said radiation detector and a point of impingement of said beam on said radiation detector

e) means for outputting an output indicative of said measured distance.

19. The system of claim 18 wherein the radiation detector comprises an array of sensors.

20. The system of claim 18 wherein the sample is a liquid in a cuvette.